

AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

Unmanned Evolution:

How Theater-Capable RPAs Will Adapt to Meet the Needs of the JFC

Digital Collections

by

Gary B. Rafnson, Major, USAF

A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

Advisor: Michael P. Ivanovsky

Maxwell Air Force Base, Alabama

April 2010

Disclaimer

The views expressed in this academic research paper are those of the author and do not reflect the official policy or position of the US government or the Department of Defense. In accordance with Air Force Instruction 51-303, it is not copyrighted, but is the property of the United States government.

Abstract

This paper compares theater-capable RPA operations in both the US Army and US Air Force. It focuses on pilot issues, not the intelligence portion of the missions. The paper describes how RPA operations in each service evolved, and will continue to evolve, to better meet the needs of the Joint Force Commander.



The Army and Air Force chiefs of staff recently met to discuss the differences between the services' "operational UAVs" (Unmanned Aerial Vehicles).¹ This paper describes some of these differences—how they began, changed, and will continue to change to meet the needs of the Joint Force and component commanders. The focus is on operational issues: pilot rank, aircraft control architecture, and RPA Command and Control (C2). Service intelligence differences, like how each service Processes, Exploits, and Disseminates (PED) Full Motion Video (FMV), are beyond the scope of this short paper.

Each service initially decided on different qualifications for its RPA operators because of their respective cultures and situations at the time. The Army chose to use enlisted operators. Since their RPAs were so few in number, and because Army aviation supports the ground maneuver commander,² why would the Army "waste" officers to fly RPAs? The Army will always be responsible for leading soldiers on the ground. As a result, Army officers must be "heroic leaders," men and women who embody "the martial spirit and the theme of personal valor."³ Playing a video game in a trailer will not inspire soldiers to encounter the dangers inherent in land warfare.

The Air Force decided to have rated officers fly RPAs. Air Force senior leaders believed the Army's RPA safety problems were because Army operators did not treat their RPAs like airplanes.⁴ "If you treat it like an airplane, it will act like an airplane," according to Gen John Jumper.⁵ Rated pilots would ensure Air Force RPAs crashed less. The results support his belief: Army theater-capable RPAs crash 3.6 times more often than Air Force RPAs (see table 1). Besides, officers fly airplanes in the Air Force. The video game stigma of RPAs affects Air Force officers less than Army officers. Missileers, satellite operators, and cyber officers are mostly "military managers," men who reflect the "scientific and pragmatic dimensions of war

making.”⁶ Unless a RPA trailer is getting shot at, RPAs require military managers more than “heroic leaders.”

The realities of operations in Iraq and Afghanistan forced the services to adjust their RPA pilot qualifications. Army warrant officers now fly RPAs along with enlisted technicians.⁷ The added rank coincided with the increased need to transit through non-Army airspace as well as the weaponization of Army RPAs in 2004.⁸ The Air Force, conversely, relaxed its qualifications for RPA pilots. September 2009 saw the first graduation of “beta test” RPA pilots—officers on a new career track—that never attended traditional pilot or navigator training.⁹ The evolution in RPA pilot qualifications enabled (1) the Army to better cope with its higher risk missions and (2) the Air Force to meet its growing Intelligence, Surveillance, and Reconnaissance (ISR) obligations. Both changes resulted in more effective RPA operations in Iraq and Afghanistan.

What is the prediction for future RPA pilot manning? Army enlisted personnel will predominately fly what Lt Gen David A. Deptula, Deputy Chief of Staff for ISR, calls “localized effect” RPAs.¹⁰ These RPAs are smaller airplanes, carry no weapons, operate without satellite help (other than Global Positioning System signals), and fly in locally-controlled airspace. Examples include the RQ-11 Pathfinder Raven, (4.2 pounds, flies up to 10 kilometers from a ground control station through a line-of-sight link) and the BATMAV Wasp III (1 pound, flies 500 feet high from a handheld remote control through a line-of-sight link).¹¹ The best enlisted pilots of localized-effect RPAs will graduate to fly the Army’s “theater-capable” RPAs—the armed and satellite-operated airplanes that coordinate with outside agencies. Warrant officers will fly only theater-capable RPAs. Such a setup best meets the needs of the Joint Force Commander (JFC) by matching rank and experience with mission complexity.

Only Air Force officers will continue to fly Air Force theater-capable RPAs. Existing rated pilots and navigators from every airframe and experience level will keep arriving in Air Force RPA squadrons. Unit leaders will be forced to covertly stratify their pilots into “shooters” and “non-shooters.” When a situation calls for weapons to be employed, mission commanders may feel the urge to switch out RPA beta test pilots for rated RPA pilots with tactical backgrounds, despite the disruption in situational awareness such substitutions create. Officer pilots best meet future JFC needs by setting up Air Force RPAs to execute emerging unmanned applications like counterair, air interdiction, and suppression of enemy air defenses.

The service chiefs likely discussed the differences in aircraft control architecture between Army and Air Force RPAs. Initially both services’ RPA units deployed forward both their combat airplanes and control stations together. Remote Split Operations (RSO), developed during Operation Iraqi Freedom, allowed Air Force crews to operate RPAs in Iraq from the United States.¹² RSO better meets JFC needs by maximizing the number of deployable RPAs while minimizing the “associated logistics and force protection” burdens.¹³ The Air Force, a service where the bulk of personnel do not go forward into harm’s way during a conflict, embraced the concept of RSOs. The Army did not.

There is something deeply counter-cultural about RSO to ground forces. Gen Anthony C. Zinni, USMC, retired, begins a chapter in one of his books with a quote from a Roman general who wrote that the only people qualified to counsel the commander are those “who are present at the scene of action,” who, “like people embarked on the same ship, are sharers of the danger.”¹⁴ Interviews of Army aviators revealed their belief that “in order to fight as a cohesive unit, the aircrew needs to deploy with the units it supports, so as to ‘feel’ the intensity and tempo of the day-to-day fight.”¹⁵ Despite the advantages of RSO, the Army insists on assigning aircraft

to specific units in a direct support relationship.¹⁶ The Army currently experiments with RSO, but “still views having skin in the game paramount to effective ground operations.”¹⁷ Army units continue to deploy according to the Army Forces Generation (ARFORGEN) model developed in 2006, where only a third of units deploy at any given time.¹⁸ The chance of an externally imposed change on how the Army deploys, while it is the supported service in Iraq and Afghanistan, is low.

What is the prediction for RPA aircraft control architecture? The Army will continue to dabble in RSO while primarily deploying in the traditional manner. A peripheral ability for the Army to fly RPAs using RSO will increase its FMV capability in the short term, enable the Army to “assert its spiritual interests”¹⁹ in traditional deployments, and allow contributing to future wars when it lacks the agility to do so normally.²⁰ The Air Force, on the other hand, will remain primarily an RSO RPA force. The Air Force chief of staff, writing about split operations, directed commanders to enable “contingency support from home station to the maximum extent possible.”²¹ Air National Guard and Air Force Reserve personnel will pick up more RSO RPA duties as the number of orbits increase, helping to return these currently over-tasked “Airman-Citizens” back into “Citizen-Airmen.”²² The difference in architecture between the services will best serve the JFC by not impeding the delivery of high-demand RPAs with intrusive demands on their development.

The architecture difference will also serve as a passive defense measure for the JFC if and when that RSO architecture fails. Army RPAs could continue operations with line-of-sight links—as far as terrain allows—if RSO RPAs were unable to fly. The Army’s “forward processing, exploitation, and dissemination (PED) integrated into the Tactical Operations Center” could continue doing their job, assuming that forward PED personnel did not need any

of the affected RSO architecture.²³ Otherwise, FMV missions would have to be “nontraditional ISR (NTISR).”²⁴ Information from NTISR missions is “gathered and disseminated immediately” through video broadcast direct to Remotely Operated Video Enhanced Receiver laptop computers, “not processed, exploited, or even documented”.²⁵ NTISR FMV, in this case, would only provide “real-time situational awareness” to local commanders instead of contributing to the JFCs “ISR collection effort.”²⁶

The service chiefs no doubt discussed RPA C2. Who decides when the airplanes take off and land, where they fly, what they look at, and who they kill? The doctrinally correct answer is the JFC. In reality, however, the land and special operations force commanders in Iraq and Afghanistan, and the air commander for the entire theater, service their own target decks with separate operations and intelligence organizations in partitioned airspace. The C2 problem becomes more complex when Marines arrive in theater. Instead of joint interdependent operations, the Marines further divide the land commander’s area, as with Multinational Force-West during the surge of 2007.²⁷ Unless the stakes to the nation are high enough (e.g. World War II or nuclear Armageddon), each military service will degenerate its efforts into separate, self-contained campaigns.²⁸ “In reality, despite improved joint ‘interdependence,’ U.S. military operations remain an amalgamation of component operations, designed for optimal employment of their organic capabilities.”²⁹ Doctrinally the JFC adjudicates these competing demands, but “after major combat operations ended in Afghanistan and Iraq, the doctrinal apportionment process stopped.”³⁰

The Army, as the supported service, uses a C2 structure that “optimally employs” its “organic” RPAs at the expense of joint interdependence. One aspect of this C2 structure is the coordinating altitude (CA). Army aircraft operating underneath the CA (normally no higher than

3,000 feet above the surface), by authority of the JFC, are not required to follow the Combined Air and Space Operations Center's (CAOC) positive-control.³¹ Another aspect of Army C2 is the Restricted Operating Zone (ROZ)—“typically a large cylinder of airspace” from the surface to medium altitude (10,000 to 25,000 feet above sea level) where the Army controls all aircraft.³² Using ROZs and a CA enables Army RPAs to operate independently of the CAOC. This independence allows Army RPAs to operate according to the “short time-cycle planning” at the Battalion- and Company-levels that “ensures success in the dynamic, IW (Irregular Warfare) environments” of Iraq and Afghanistan.³³ Battalion- and Company- level planners decide when Army RPAs will take off and land, where they fly, and what they look at. The JFC needs the IW success that this planning and C2 provides.

The Air Force, as the supporting service, proactively evolves to more effectively serve ground commanders in theater. Air Force pilots, of both manned and unmanned aircraft, strive for the “timely engagement of hostile forces” despite the suboptimal complications posed by ROZs and the CA.³⁴ The CAOC “sends individual experts and planning teams out into the field when needed”³⁵ to alleviate the fact that “most Division and Brigade air liaison officers (ALOs) do not have the training or expertise to package ISR and EW assets and kinetic platforms effectively” in their planning.³⁶ The current Coalition Forces Air Component Commander (CFACC, a USAF lieutenant general) even delegated his planning and execution authority down to the individual Air Component Coordination Elements (USAF major generals) in Iraq and Afghanistan.³⁷ The temporary relaxation of centralized control of airpower at the operational level by the Air Force best meets the needs of the JFC by recognizing that the “true supported commander for COIN (Counterinsurgency) operations is not at the JTF (Joint Task Force) or

CFLCC (Coalition Forces Land Component Commander) level,” but “at the brigade and battalion levels.”³⁸

What is the prediction for RPA C2? The Army will, as long as the JFC allows, keep airspace control and air integration planning away from the CAOC to enable the decentralized operations that IW requires. The Air Force will sacrifice centralized control of airpower at the operational level as long as the low intensity of current combat air operations permits. Air Force RPA and ISR operations will look more like CAS operations. ISR liaison teams, like Tactical Air Control Parties, will control sensors and provide the Airman’s perspective for ISR to supported units.³⁹ New mission types, like X-ISR, will allow RPA and other ISR aircraft to respond faster to changes in the IW battlespace.⁴⁰ The CAOC will retain the flexibility to revoke ROZs, with JFC authority, and revert to preplanned missions on a standard Air Tasking Order if major conventional operations recur. The continued dominance of the Army, coupled with the flexible support from the Air Force, best meets the needs of the JFC by concentrating on today’s war while maintaining the ability to handle unexpected high-intensity combat when it occurs.

Army and Air Force theater-capable RPA operations adapt to JFC needs. Each service initially chose to use different ranks for its RPA pilots, only to adjust as circumstances required. Both the Army and Air Force began with the same aircraft control architecture, but chose separate courses once RSO became possible. RPA C2, initially mimicking Air Force-dominated air operations in a conventional war, continues evolving to ensure America wins in Iraq and Afghanistan. With luck, the RPA evolution in both services will produce a robust RPA force able to meet future JFC objectives regardless of the conflict type or the supported service.

Table 1. Drone mishap comparison

Drone model	Number of class A or B mishaps per 100,000 hours after 10,000 cumulative flight hours ^a
RQ-7 Shadow 200	375
MQ-5B Hunter	95
I-Gnat-ER	26
Total Army	496
RQ-4 Global Hawk	46
MQ-1 Predator	45
MQ-9 Reaper	47
Total Air Force	138

Adapted from Department of Defense. *FY2009-2034 Unmanned Systems Integrated Roadmap* (Washington, DC: Department of Defense, 2009).

Note: Of the 34 drones in the roadmap, only the six above apply: they are the Army/Air Force drones that require more than being simply thrown in the air, like the 10,000 four pound RQ-11s currently in both inventories.

^aNumbers interpreted from figure A.2. on page 93

Endnotes

¹ CSS, ACSC.

² Field Manual (FM) 1-100, *Army Aviation Operations*, 21 February 1997, 1-3.

³ Morris Janowitz, *The Professional Soldier* (New York, NY: Macmillan), 21.

⁴ Lt Col Houston R. Cantwell, "Operators of Air Force Unmanned Aircraft Systems: Breaking Paradigms," *Air and Space Power Journal* 23, no. 2 (Summer 2009): 68.

⁵ Quoted in Cantwell, 68.

⁶ Janowitz, 21.

⁷ US Army's Recruiting Command's Warrant Officer Recruiting Information Site, <http://www.usarec.army.mil/hq/warrant/prerequ/WO150U.html> (accessed 19 March 2010). The Army Warrant Officer Military Occupation Specialty "150U" is "Tactical Unmanned Aerial Vehicle Operations Technician."

⁸ Department of Defense, *FY2009-2034 Unmanned Systems Integrated Roadmap* (Washington, DC: Department of Defense, 2009), 65. The first Army RPA with a weapon was the MQ-5B in 2004.

⁹ Ryan Mattox, "UAS mission enters new chapter with graduation," *Air Force News*, http://www.af.mil/news/story_print.asp?id=123169844 (accessed 16 March 2010).

¹⁰ Lt Gen David A. Deptula, "Unmanned Aircraft Systems: Taking Strategy to Task," *Joint Forces Quarterly*, issue 49 (2d quarter 2008): 50.

¹¹ Department of Defense, *Integrated Roadmap*, 54, 69.

¹² "Predator CAPs double in one year," Air Force.mil, <http://www.af.mil/news/story.asp?id=123097490> (accessed 16 March 2010).

¹³ Deptula, 50.

¹⁴ Quoted in Gen Tony Zinni and Tony Koltz, *The Battle for Peace: A Frontline Vision of America's Power and Purpose* (New York, NY: Palgrave Macmillan), 15. The quote is from Lucius Amelius Paulus, circa 172 B.C.

¹⁵ Maj Travis A. Burdine, "The Army's 'Organic' Unmanned Aircraft System: An Unhealthy Choice for the Joint Operational Environment," *Air and Space Power Journal* 23, no. 2 (Summer 2009): 97.

¹⁶ Kate Brannen, U.S. Army Considers Remote Operations for Sky Warrior," *DefenseNews*, <http://www.defensenews.com/story.php?i=4484622> (accessed 16 March 2010).

¹⁷ CSS, ACSC.

¹⁸ Staff Sgt. Alexandra Hemmerly-Brown, "ARFORGEN: Army's deployment cycle aims for predictability," *Army.mil*, <http://www.army.mil/-news/2009/11/19/30668-arforgen-armys-deployment-cycle-aims-for-predictability/> (accessed 16 March 2010).

¹⁹ Colin S. Gray, "Understanding Airpower: Bonfire of the Fallacies," *Strategic Studies Quarterly* vol. 2, no. 4 (Winter 2008), 44.

²⁰ If a Kosovo-like operation were to occur, the Army could use its RSO RPAs while the rest of its forces started to deploy. Until the big Army arrived, Army RSO RPAs would likely have to submit to Air Force/JFACC exploitation methods (DCGS) and C2.

²¹ General T. Michael Moseley, chief of staff, US Air Force, *Air Force Forces Command and Control Enabling Concept (Change 2)*, 25 May 2006.

²² General John A. Shaud, USAF, retired, "In Service to the Nation...Air Force Research Institute Strategic Concept for 2018-2023," *Strategic Studies Quarterly* vol. 2, no. 4 (Winter 2008): 23.

²³ BG Michael T. Flynn, COL Rich Juergens, and MAJ Thomas L. Cantrell, "Employing ISR: SOF Best Practices," *Joint Forces Quarterly*, 3rd Qtr 2008: 59.

²⁴ Lt Col Clint Hinote, "Centralized Control and Decentralized Execution: A Catchphrase in Crisis?," *Research Paper 2009-1* (Maxwell AFB, AL: Air University), 40.

²⁵ Ibid.

²⁶ Ibid., 41.

²⁷ Ibid., 25.

²⁸ CSS, ACSC.

²⁹ David E. Johnson, *Learning Large Lessons: The Evolving Roles of Ground Power and Air Power in the Post-Cold War Era* (Santa Monica, CA: RAND Corporation), 141.

³⁰ Hinote, 25.

³¹ Burdine, 95.

³² Ibid.

³³ Lt Col William E. Pinter, "Improving Air Force Combat Capabilities and Theater Command and Control for Major Combat Operations and Irregular Warfare" (Air War College Research Paper, Air University, 2009), 10.

³⁴ Deptula, 50.

³⁵ Hinote, 36.

³⁶ Pinter, 11.

³⁷ CSS, ACSC.

³⁸ Lt Col Michael L. Downs, "Rethinking the Combined Force Air Component Commander's Intelligence, Surveillance, and Reconnaissance Approach to Counterinsurgency," *Air and Space Power Journal* 22, no. 3 (Fall 2008): 95. <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/fal08/downs.html> (accessed 1 Feb 2010).

³⁹ Maj Michael Grunwald, Jr., "Transforming Air Force ISR for the Long War and Beyond," Air Command and Staff College Wright Flyer Paper No. 36 (Maxwell AFB, AL: Air University), 7-8, 13.

⁴⁰ Ibid., 11.



Bibliography

- Brannen, Kate. "U.S. Army Considers Remote Operations for Sky Warrior." *DefenseNews*, 3 February 2010, <http://www.defensenews.com/story.php?i=4484622> (accessed 16 March 2010).
- Burdine, Maj Travis A. "The Army's 'Organic' Unmanned Aircraft Systems: An Unhealthy Choice for the Joint Operational Environment." *Air & Space Power Journal* 23, no. 2 (Summer 2009): 88-100.
- Cantwell, Lt Col Houston R. "Operators of Air Force Unmanned Aircraft Systems: Breaking Paradigms." *Air & Space Power Journal* 23, no. 2 (Summer 2009): 67-77.
- Deptula, Lt Gen David A. "Unmanned Aircraft Systems: Taking Strategy to Task." *Joint Forces Quarterly* 49 (2nd Qtr 2008): 49-51.
- Downs, Lt Col Michael L. "Rethinking the Combined Force Air Component Commander's Intelligence, Surveillance, and Reconnaissance Approach to Counterinsurgency." *Air & Space Power Journal* 22, no. 3 (Fall 2008), <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/fal08/downs.html> (accessed 1 February 2010).
- Field Manual (FM) 1-100. *Army Aviation Operations*, 21 February 1997.
- Flynn, BG Michael T., COL Rich Juergens, and MAJ Thomas L. Cantrell. "Employing ISR: SOF Best Practices." *Joint Forces Quarterly* (3rd Qtr 2008): 56-61.
- Gray, Colin S. "Understanding Airpower: Bonfire of the Fallacies." *Strategic Studies Quarterly* 2, no. 4 (Winter 2008): 43-83.
- Grunwald, Maj Michael Jr. *Transforming Air Force ISR for the Long War and Beyond*. Air Command and Staff College Wright Flyer Paper No. 36. Maxwell AFB, AL: Air University Press, January 2009.
- Hemmerly-Brown, Staff Sgt. Alexandra. "ARFORGEN: Army's Deployment Cycle Aims for Predictability." *Army.mil*, 19 November 2009, <http://www.army.mil/news/2009/11/19/30668-arforgen-armys-deployment-cycle-aims-for-predictability/> (accessed 16 March 2010).
- Hinote, Lt Col Clint. *Centralized Control and Decentralized Execution: A Catchphrase in Crisis?* Air Force Research Institute Papers, no. 2009-1. Maxwell AFB, AL: Air University Press, March 2009.

Janowitz, Morris. *The Professional Soldier: A Social and Political Portrait*. New York, NY: Macmillan, 1971.

Johnson, David E. *Learning Large Lessons: The Evolving Roles of Ground Power and Air Power in the Post-Cold War Era*. Santa Monica, CA: RAND Corporation, 2007.

Mattox, Ryan. "UAS Mission Enters New Chapter with Graduation." *AF.mil*, 28 September 2009, <http://www.af.mil/news/story.asp?id=123169844> (accessed 16 March 2010).

Moseley, General T. Michael, chief of staff, US Air Force. *Air Force Forces Command and Control Enabling Concept (Change 2)*, 25 May 2006.

Pinter, Lt Col William E. "Improving Air Force Combat Capabilities and Theater Command and Control for Major Combat Operations and Irregular Warfare." Air War College Research Paper, Air University, 2009.

"Predator CAPs Double in One Year." *AF.mil*, 6 May 2008, <http://www.af.mil/news/story.asp?id=123097490> (accessed 16 March 2010).

Shaud, Gen John A., retired. "In Service to the Nation...Air Force Research Institute Strategic Concept for 2018-2023." *Strategic Studies Quarterly* 2, no. 4 (Winter 2008): 14-42.

U.S. Army's Recruiting Command's Warrant Officer Recruiting Information Site. "150U – Tactical Unmanned Aerial Vehicle (TUAV) Operations Technician." <http://www.usarec.army.mil/hq/warrant/prerequ/WO150U.html> (accessed 19 March 2010).

US Department of Defense. *FY2009-2034 Unmanned Systems Integrated Roadmap*. Washington, DC: Department of Defense, April 2009.

Zinni, Gen Tony and Tony Koltz. *The Battle for Peace: A Frontline Vision of America's Power and Purpose*. New York, NY: Palgrave Macmillan, 2006.